

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/778,365	02/08/2001	George G. Barclay	50533	6843

7590

05/29/2002

EDWARDS & ANGELL, LLP
Dike, Bronstein, Roberts & Cushman, IP Group
130 Water Street
Boston, MA 02109

EXAMINER

HAMILTON, CYNTHIA

ART UNIT

PAPER NUMBER

1752

DATE MAILED: 05/29/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

TC-11

Office Action Summary

Application No.

09/778,365

Applicant(s)

BARCLAY ET AL.

Examiner

Cynthia Hamilton

Art Unit

1752

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 2/8/01, 9-5-01.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

Art Unit: 1752

DETAILED ACTION

1. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. (e) as follows:

Applicants failed to file no later than 12 months after the date of the provisional application (SN 60/180,905). Thus, **the effective filing date for this application is February 8, 2001.**

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 1752

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-11, 13-14, 17-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Kim (5,389,494). In Kim, see particularly col. 3, line 65 to col. 4, lines 6 and Examples. The methods of the examples of Kim anticipate the instant methods and the photoresists of Examples 2-4 anticipate the instant photoresists wherein tetrahydrofuran and methylene chloride are both used to extract the polymer, ethyl acetate and naphtha are also used to treat the polymer before it is mixed with a sulfonium photoacid generator to form a photoresist. These steps inherently remove smaller molecular weight components as well as other impurities from the polymer of Kim. The acid cleavable groups are beta-halogenated alkyl carbonate groups as set forth in col. 2, lines 15-52 of Kim. The resist solutions is spin coated onto a silicon wafer which is a microelectronic wafer substrate as disclosed by Kim at the bottom of col. 5.

7. Claims 1-10 and 17-23 are rejected under 35 U.S.C. 102(b) as being anticipated by Laridon et al. In Laridon et al, see particularly Examples 1-4 and col. 1, lines 4-12. The method of making the imaging layer form the etching resist, i.e. a photoresist, of Laridon et al wherein the azide polymers are diluted with methylene chloride then filtered then poured into methanol and precipitated out then these steps repeated meet the "treating a prepared resin with one or more organic solvents" of the instant method and composition. In each Example of Laridon et al a sensitizing agent is added then the solution coated onto an aluminum foil. The repeated steps of methanol and methylene chloride treatment would inherently remove the impurities including smaller reacted materials such as to remove low molecular weight species. Thus, the processes

Art Unit: 1752

and etch resists of Laridon et al anticipate, with respect to instant claims 1-10 and 17-23, the instant invention.

8. Claims 1-3, 5-6, 8-9, 11, 13, 17, 22 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Kawabe et al (5,707,776). Production Example 10 of Kawabe et al makes a polymer with treatment with methanol to remove low molecular components. In Table 2, Example 10 the polymer is mixed with a photoacid generator to form a radiation sensitive composition then spun on a silicon wafer. This method and composition of Kawabe et al anticipates the instant photoresist and method of instant claims 1-3, 5-6, 8-9 11, 13, 17 and 22-24. The wafer is a microelectronic wafer substrate.

9. Claims 1-6, 8-9, 11, 13, 17-19, 22-24 are rejected under 35 U.S.C. 102(a) as being anticipated by Wanat et al (WO 00/33137). The processes of separating the novolak resin of Wanat with ethyl lactate and methanol as set forth by Wanat et al in their examples and claims to remove smaller molecular weight components from the polymer mixture anticipates the instant methods of applicants in instant claims 1-6, 8-9, 11, 13, 17-19 and 22-24. The Wanat et al photoresist compositions are spin on wafers which are microelectronic wafer substrates.

10. Claims 1-3, 5-6, 8-9, 11, 13-14, 17, 19, 22-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Sato et al (5,700,625). In Sato et al, see particularly the Abstract, summary of the invention, col. 2, lines 50-68, col. 3, col. 4, lines 35-39, Preparation Example and Examples and Claims. With respect to instant claims 1-3, 5-6, 8-9, 11, 13-14, 17, 19, 22-24, the photoresists coated on silicon wafers, the photoresists, and the methods of making the polymers by fractionating with organic solvents set forth by Sato et al anticipate the instant invention. Sato uses in the Preparation n-hexane, methyl alcohol and ethyl lactate. Sato et al lists using

Art Unit: 1752

ethyl alcohol, n-heptane and other polymers to fractionate via using mixtures of organic solvents to remove low molecular species of the polyhydroxy styrene polymers. This is the heart of what is going on in instant claims 5-6. In col. 3, lines 46-65, part of the hydroxy groups can be substituted with alkali solubility reducing groups capable of being decomposed in the presence of an acid. The silicon wafer used as a substrate in the Examples is a microelectronic wafer substrate.

11. Claims 1-6, 8-10, 17-19, 21, 23-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Kajita et al (EP 0 930 541 A1). In Kajita et al, see particularly paragraph[0066] and Synthesis Example 3-6, 8-10, 12, 14 and Examples. The process of washing repeatedly the polymers of Kajita et al with n-hexane and I-propyl alcohol or just hexane with the added disclosure that such steps act to remove the components with Mw less than 2000 by liquid-liquid extraction using a good solvent and a poor solvent in [0066] anticipate, with respect to instant claims 1-6, 8-10, 17-19, 21 and 23-27, the instant method, composition and substrate.

12. Claims 1-3, 5-6, 8-11, 13, 17, 21-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Wanat et al (WO 98/27462). The process for preparing the polymer with the removal of the low molecular weight polymeric fractions by use of solvents inclusive of methanol, ethyl lactate and acetone to form photoresist compositions set forth by Wanat et al anticipate the instant invention and the processes of the prior art inherently remove smaller resin species with Mw of about 2,000 or less. In Wanat et al, see particularly Abstract, page 4-6, lines 19 on page 6 to lines 22 on page 7, page 8, line 30 through page 9, page 12 first paragraph and Examples and claims.

Art Unit: 1752

13. An 1977-13895Y cited by applicants is drawn to an electron beam resist material wherein no photoactive component is admixed with the prepared resin. Such resins do not need additives to be imaged with electron beam. Polymethylmethacrylate is well known to function alone. However, the teaching of removing the lower fractions is noted as relevant with respect to electron beam degradable resists.

14. Claims 1-3, 5-6, 8-11, 13, 17, 19 21-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Rahman et al (WO 98/27129). With respect to instant claims 1-3, 5-6, 8-11, 13, 17, 19 21-24, the processes of Rahman et al wherein the novolak resin is fractionated by solvent interaction to yield a resin with consistent molecular weight and superior photoresist performance anticipate the instant methods, compositions and substrates. In Rahman et al, see particularly the Abstract, Summary of the Invention (page 5, extracting with ethers, glycols, alcohols are all disclosed), page 12, lines 22-29, Examples wherein ethyl lactate and methanol are used for treatment of the resin and the claims. The methods inherently remove the organic resin species of Mw less than 100, 500 and 1000 as indicated by Table 1 on page 13 with respect to polydispersity given in Rahman et al.

15. Claims 1-6, 8-11, 13-14, 16-19, 21-24 are rejected under 35 U.S.C. 102(e) as being anticipated by Takeda et al (US 2001/0036593 A1). The processes, photoresists and coated substrates of Takeda et al anticipate with respect to instant claims 1-6, 8-11, 13-14, 16-19, 21-24, applicants' invention. While specific ranges of molecular weight range components excluded by the extraction steps of Takeda et al are not disclosed the molecular weights obtained along with the molecular weight dispersity achieved is indicative such components are removed by the steps given in the Examples of Takeda et al. The solvents used in the examples are acetone, diethyl

Art Unit: 1752

ether, hexane and ethyl acetate. In Takeda et al, see particularly [0013, 0025, 0028, 0099, 0100], Synthetic Examples and Examples and claims 3-4.

16. Claims 1-3, 8-10, 17, 21-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakano et al (5,738,975). In Nakano et al, see particularly abstract, Embodiments. With respect to instant claims 1-3, 8-10, 17, 21-24, the processes, compositions and coated substrates of Nakano et al anticipate the instant invention wherein the organic solvent used is hexane for repeated precipitation of the polymer.

17. Claims 1-11, 13-14, 17-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Ito et al (4,491,628). In Ito et al, see particularly col. 4, lines 45 to col. 5, lines 47 and Examples. The polymers of Ito et al are diluted with dichloromethane, ie methylene chloride, precipitated with petroleum ether, washed with petroleum ether then methanol or precipitated with the aid of methanol and dissolved with chloroform then re precipitated in methanol to obtain polymers with number average molecular weights of 43,000 or higher. Thus, the lower molecular weight resin components of the reaction are removed by the cleansing steps of Ito et al inherently. Thus, the processes, photoresists and coated substrates of Ito et al anticipate the instant invention with respect to instant claims 1-11, 13-14, 17-24.

18. Claims 1-11, 13-14, 17-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Crivello et al (4,603,101). In Crivello et al, see particularly col. 1, lines 37 to col. 2, lines 19, col. 5, lines 19-44 and Examples with special regard to col. 6, lines 41-55 wherein the polymer made is dissolved in methylene chloride, precipitated in methanol and washed in methanol. The process of purifying the t-butylvinyl aryl ether polymers set forth by Crivello et al anticipates the instant method, photoresists and coated substrates of the instant invention with respect to

Art Unit: 1752

instant claims 1-11, 13-14, and 17-24. The cleansing steps for the polymer inherently remove the resin species of less than 200, 1000, 500 and 100 Mw in the processes of Ito et al.

19. Claims 1-6, 8-9, 11, 13, 17-19, 22-24 are rejected under 35 U.S.C. 102(e) as being anticipated by Suzuki et al (US2000/0012865 A1). In Suzuki et al, see particularly Summary of the Invention and [0037-0039]. The method of fractionating the novolak resin to be used as the alkali-soluble resin of Suzuki et al wherein methanol, ethanol, acetone, ether acetates and ketones are useable to dissolve the resin anticipates the instant methods, compositions and substrates in instant claims 1-6, 8-9, 11, 13, 17-19, 22-24. The methods are states to remove all low molecular weight fractions and since the lowest molecular weight desired by Suzuki et al is 2000, the examiner holds the processes set forth do remove all resin species of about 2000 or less molecular weight.

20. Claims 1, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thackeray et al (5,514,520) in view of Rahman et al (WO 98/27129). Thackeray et al cited by applicants on page 7 of their specification as teaching the of inert blocking groups in phenolic resins used in the instant photoresist compositions teach the instant invention with the exception of not teaching how the novolak resins and polyvinyl phenol resins they use are prepared for use as photoresist binders. However, in col. 3, lines 3-16, they teach conventional ones are used. With respect to the manner of preparation, one of those conventional processes is set forth by Rahman et al wherein the novolak resin is fractionated by solvent interaction to yield a resin with consistent molecular weight and superior photoresist performance anticipate the instant methods, compositions and substrates. In Rahman et al, see particularly the Abstract, Summary of the Invention (page 5, extracting with ethers, glycols, alcohols are all disclosed), page 12, lines 22-

Art Unit: 1752

29, Examples wherein ethyl lactate and methanol are used for treatment of the resin and the claims. The methods inherently remove the organic resin species of Mw less than 100, 500 and 1000 as indicated by Table 1 on page 13 with respect to polydispersity given in Rahman et al.

21. With respect to instant claims 1 and 15, the use of the method of Rahman et al to prepare the novolak resins of Thackeray et al for use would have been *prima facie* obvious to obtain a resin with narrow Mw range and to avoid high temperature distillation for separating the novolak resins as taught by Rahman et al in their abstract and avoid the degradation of the photoresist due to the partially depolymerized novolacs.

22. Claims 1 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicants' disclosure in view of Thackeray et al (5,514,520) in view of Rahman et al (WO 98/27129 and Aviram et al (6,346,362 B1). Applicants disclose many prior art novolak as well as polyvinylphenol based resins useful in their method on pages 7-8. Thackeray et al cited by applicants on page 7 of their specification as teaching the use of inert blocking groups in phenolic resins used in the instant photoresist compositions teach the instant invention with the exception of not teaching how the novolak resins and polyvinyl phenol resins they use are prepared for use as photoresist binders. However, in col. 3, lines 3-16, they teach conventional methods are used. The need to remove the lower molecular weight fractions while making these polymers is known as taught by Rahman et al. Another method for removing lower weight fractions of polyvinylphenol when making such polymers is taught by Aviram et al in their Example 4, They put the dry solid polymer in a Soxhlet apparatus and extract with hexane for 24 hours. With respect to instant claims 1 and 12, the same technique would have been *prima facie* obvious as

Art Unit: 1752

another method of non distillation as sought by Rahman et al to use to form the instant polymers or those of Thackeray et al.

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia Hamilton whose telephone number is (703) 308-3626. The examiner can normally be reached on Monday-Friday, 9:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Janet Baxter can be reached on (703) 308-2303. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 305 0661.

Cynthia Hamilton
May 24, 2002



CYNTHIA HAMILTON
PRIMARY EXAMINER

24.